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Optimization of thermostable organic solvent - tolerant lipase production by thermotolerant Rhizopus sp. using solid - state fermentation of palm kernel cake (Article)

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Abstract

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This study enhanced the production of thermostable organic solvent - tolerant (TS-OST) lipase by locally isolated thermotolerant Rhizopus sp. strain using solid - state fermentation (SSF) of palm kernel cake (PKC). The optimum conditions were achieved using a series of statistical approaches. The cultivation parameters, which include fermentation time, moisture content, temperature, pH, inoculum size, various carbon and nitrogen sources, as well as other supplements, were initially screened by the definitive screening design, and one-factor-at-a-time using PKC as the basal medium. Three significant factors (olive oil concentration, pH, and inoculum size) were further optimized using face-centred central composite design. The results indicated a successful and significant improvement of lipase activity by almost two-fold compared to the initial screening production. The findings showed that the optimal conditions were 2% (v/w) inoculum size, 2% (v/w) olive oil, 0.6% (w/w) peptone, 2% (v/w) ethanol, 70% moisture content at initial pH 10.0 and 45 °C within 72 h of fermentation. Process optimization resulted in maximum lipase activity of 58.63 U/gram dry solids (gds). The analysis of variance showed that the statistical model was significant (p value <0.0001) and reliable with a high value of R<sup>2</sup> (0.98) and adjusted R<sup>2</sup> (0.96). This indicates a better correlation between the actual and predicted responses of lipase production. By considering this study, the low-cost PKC through SSF appears to be promising in the utilization of agro-industrial waste for TS-OST lipase production. This is because satisfactory enzyme activity could be attained that promises industrial applications. © 2017, Springer-Verlag GmbH Germany.

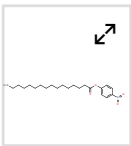
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Substances



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- Palm kernel cake
- Rhizopus sp
- Solid - state fermentation
- Thermostable organic solvent - tolerant lipase

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